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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/743,716	12/24/2003	Takeshi Kijima	118193	8331

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EXAMINER	
OWENS, DOUGLAS W	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/743,716	KIJIMA ET AL.	
	Examiner	Art Unit	
	Douglas W. Owens	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25 and 27-29* is/are rejected.

7)☒ Claim(s) *26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 December 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: '104', which appears in Fig. 1. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claim 26, requires that the ferroelectric thin film comprise silicon, or silicon and germanium in elements of ferroelectric. This embodiment is not disclosed in the specification.

Claim Objections

3. Claim 8 is objected to because of the following informalities: in line 2 of the claim, --to-- should be inserted between "direction" and "have". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4 – 7 and 16 – 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 4 recites the limitation "the 180° domains" in line 2. There is insufficient antecedent basis for this limitation in the claim.

7. Claim 5 recites the limitation "the 90° domains" in line 2. There is insufficient antecedent basis for this limitation in the claim.

8. Claim 6 recites the limitation "the 180° domains" in line 2. There is insufficient antecedent basis for this limitation in the claim.

9. Claim 7 recites the limitation "the 90° domains" in line 2. There is insufficient antecedent basis for this limitation in the claim.

10. Claims 6 and 7 require that the domains be "reversely rotated". The scope of the claims are not clear because the direction a domain must be rotated to be reversely rotated is not known.

11. Claims 16 – 23 recite the limitation "full width half maximum of 2° or less". Examiner does not understand what is intended by this limitation.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1 – 5, 8 – 12, 25 and 27 – 29 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent Application Publication No. 2002/0102791 to Kurasawa et al.

Regarding claim 1, Kurasawa et al. teach a ferroelectric thin film formed of crystals in which directions of polarization axes are inconsistent with an applied electric filed direction in a crystal system (Paragraph [0014]).

Regarding claim 2, Kurasawa et al. teach a ferroelectric thin film formed of crystals in which directions of 180° domains are inconsistent with an applied electric field direction in a crystal system.

Regarding claim 3, Kurasawa et al. teach a ferroelectric thin film formed of crystals in which directions of 90° domains are inconsistent with a direction perpendicular to an applied electric field direction in a crystal system.

Regarding claim 4, Kurasawa et al. teach a ferroelectric thin film, wherein the 180° domains are arranged at a constant angle to the applied electric field direction, since Kurasawa et al. do not teach varying the angle.

Regarding claim 5, Kurasawa et al. teach a ferroelectric thin film wherein the 90° domains are arranged at a constant angle to the applied electric field direction.

Regarding claim 8, Kurasawa et al. teach a ferroelectric thin film, wherein polarization is arranged at a constant angle to the applied electric field direction to have the same polarization in the same applied electric field.

Regarding claim 9, Kurasawa et al. teach a ferroelectric thin film, formed of a polycrystal highly oriented in the applied electric field direction in a ferroelectric thin film plane.

Regarding claim 10, Kurasawa et al. teach a ferroelectric thin film, but has no teaching of a polarization axis distribution that exhibits anisotropy with respect to the applied electric field direction in a ferroelectric thin film plane.

Regarding claim 11, Kurasawa et al. teach a ferroelectric thin film using a tetragonal $Pb(Zr,Ti)O_3$ ferroelectric which is (111)-oriented along the applied electric field direction with respect to a ferroelectric thin film plane (Paragraphs [0006] and [0007]).

Regarding claim 12, Kurasawa et al. teach a ferroelectric thin film using a rhombohedral ($Pb(Zr,Ti)O_3$ ferroelectric which is (001)-oriented along the applied electric field direction with respect to a ferroelectric thin film plane (Paragraph [0009]).

Regarding claims 25 and 27, these are considered product-by-process claims and have not been given any patentable weight. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of

production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

Regarding claim 28, Kurasawa et al. teach a ferroelectric memory device, utilizing the ferroelectric thin film defined above.

Regarding claim 29, Kurasawa et al. teach a ferroelectric piezoelectric device using the ferroelectric thin film as defined above.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurasawa et al. as applied to claim 1 above, and further in view of US Patent No. 6,737,690 to Higuchi et al.

Kurasawa et al. do not teach a ferroelectric film using an $SrBi_2Ta_2O_9$ (bismuth-layer structure), which is (111) or (110) oriented along the applied electric field direction. Higuchi et al. teach a ferroelectric film using an $SrBi_2Ta_2O_9$ (bismuth-layer structure), which is (111) or (110) oriented along the applied electric field direction (Col. 3, lines 38 – 42 and Col. 3, line 66 – Col. 4, line 4). It would have been obvious to one of ordinary

skill in the art to incorporate the teaching of Higuchi et al. into the teaching of Kurasawa et al., since it is desirable to use materials that are well suited for the intended use.

16. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurasawa et al. as applied to claim 1 above, and further in view of US Patent Application Publication No. 2001/0013311 to Migita et al.

Kurasawa et al. do not teach a $Bi_4T_3O_{12}$ ferroelectric with a (117), (111), (107) or (317) orientation along the applied electric field direction. Migita et al. teach a $Bi_4T_3O_{12}$ ferroelectric with a (117) orientation (paragraph [0051]). It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Migita et al. into the device taught by Kurasawa et al., since it is a known material that is well suited for the intended use.

17. Claim 26 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W. Owens whose telephone number is 571-272-1662. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Douglas W. Owens

Douglas W Owens
Examiner
Art Unit 2811